TIDE TABLES

FOR

NELSON, HUDSON BAY

AND TIDAL DATA FOR

HUDSON STRAIT and JAMES BAY

FOR THE SEASON OF

1920

Issued by the TIDAL AND CURRENT SURVEY in the DEPARTMENT OF THE NAVAL SERVICE of the DOMINION OF CANADA.

W BELL DAWSON, D.Sc., M.Inst.C.E., F.R.S.C., Superintendent.

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J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
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TIDES IN HUDSON BAY AND STRAIT.

In Hudson strait the tide has an unusual range, the average at Ashe inlet in the central part of the strait being 30½ feet at the Springs and 15¼ feet at the Neaps. The duration of rise and fall is almost equal, and there is very little diurnal inequality; but the semi-monthly variations are extremely large. The Spring range is twice the Neap range as above indicated; and the variation with the Moon's distance, from perigee to apogee, may occasion a difference of almost 7 feet in the range of successive Spring tides.

After extended comparisons with places having similar tidal features, St. John, N.B. has proved to be a satisfactory port of reference for Hudson strait; as the dominant characteristic in the Bay of Fundy is variation with the Moon's distance.

The long series of observations obtained in Hudson strait by the Gordon expeditions of 1884 to 1886 were compared with the tide at St. John as recalculated for those years by means of tidal constants deduced from fifteen complete years of tidal record there. The observations at Ashe inlet, available for comparison, make up a total of 18 months of which seven months were day and night observations and the remainder in the day time only. Tidal differences for other localities in the strait were determined relatively to Ashe inlet. It is the time of the tide which is of primary importance practically, to afford a basis for comparison with the strong tidal streams in this strait.

In Hudson bay the tide is of two distinct types, one being an open-water type as found at Churchill where the duration of the rise is longer than the fall; and the other an estuary tide of an extreme type, as exemplified at Nelson. These characteristics are quite similar in James bay; and the tides at Churchill and Nelson are thus probably typical of the whole region. Their contrasting features are as follows:—

Churchill.—Range, at Springs 13¼ feet; at Neaps 7¾ feet;
Duration of Rise, 6h. 25m. Fall 6h. 00m.

Nelson.— Range, at Springs 14½ feet; at Neaps 11 feet.
Duration of Rise 4h. 20m. Fall 8h. 05m.

When the endeavour was made to find tidal stations which would serve as ports of reference for these harbours, it appeared possible that the tides of Hudson bay should be similar to those in the North Sea, as these two areas are similarly situated with respect to the general tide of the North Atlantic. After considerable research, it was discovered that this is actually the case. The tide at Harwich, England, was found to resemble Churchill closely in almost all its features; and one of the estuary ports in the extreme south-eastern angle of the North Sea was found to be in good accord with Nelson. The time-differences with the tide in these harbours are remarkably constant, and it thus becomes possible to calculate tide tables for Churchill and Nelson.

At these two places, observations were obtained from 1910 to 1913 by co-operation with the Railways and Canals Department and the Hydrographic Survey. At Nelson, observations were continued to 1917 by the Tidal Survey; and they thus include six seasons, making in all 15 months available as a basis for calculation. The tidal difference with the port of reference in the North Sea is used to compute the time of High Water; and the time of Low Water is deduced from High Water by the duration of the fall of the tide, with allowance for its variation during the course of the month. The rise of the tide is first brought into relation with the Moon's phases from Springs to Neaps; and a correction is then applied for the influence of the Moon's distance, which is relatively large. The data on which these calculations are based have been revised throughout, by correlation with the later observations.

Standard Time.—The extent of Hudson strait from Cape Chidley westward and the whole of James bay, come properly within the limits of Eastern Standard time for the 75th Meridian west. The change to Central Standard time should be made in the vicinity of the Cape (Henrietta Maria) which limits James bay on the west side. The whole of the western side of Hudson bay proper, then falls within the limits of Central Standard or 90th Meridian time. These distinctions are made in the Tidal Differences which follow.

TIDAL DIFFERENCES FOR HUDSON BAY AND STRAIT.

Hudson strait.

ASHE INLET in the middle of the length of Hudson strait. For High Water in Eastern Standard time, subtract 3h. 33m. from H. W. at St. John, N.B., and for Low Water subtract 3h. 40m. from L. W. at St. John, as published in the Tide Tables for Eastern Canada.

The following localities are referred to Ashe inlet; and all results obtained by the differences will be in Eastern Standard time.

Locality.	For High Water.	For Low Water.	Rise.	
			Springs.	Neaps.
	H. M.	H. M.	feet.	feet.
Port Burwell	Subt. 0 27	Subt. 0 30	19	14¼
Ungava bay, at Kuksoak river	Add 0 15	Add –	38½	.....
Chimo. Hudson Bay Co.'s Post	" 1 23	" –	25	.....
ASHE INLET	" 0 00	" 0 00	30½	22
Stupart bay	Subt. 0 24	Subt. 0 34	24	18
Nottingham island, at DeBoucherville	Add 1 38	Add 1 44	13	9½
Digges island, at Laperrière	" 1 28	" 1 38	8½	6¼

The Tidal Differences for the above localities throughout the strait, are based upon observations simultaneous with Ashe inlet; except for Laperrière, which was compared with observations at DeBoucherville, and thus brought into relation with Ashe inlet. The values for Ungava bay and Chimo are based on difference of Establishment.

Hudson bay.

CHURCHILL.—For either High or Low Water in Central Standard time, subtract 3h. 53m. from H. W. or L. W. at Harwich as now published in the British Tide Tables in Greenwich Mean time.

NELSON.—The differences for other localities in this vicinity are as follows: at Nelson shoal, thirty miles outside the mouth of Nelson river northward, High Water is about one hour earlier, and Low Water two hours earlier than at Nelson. At Sands creek, 10 miles below Nelson, High Water is 45m. earlier; and at Seal island, 12 miles above Nelson, it is 40m. later.

James bay.

The differences given below are to added to the tide tables indicated, and the results for all localities in James bay will be in Eastern Standard time. Some localities are referred to Harwich, as tide tables for Churchill are not available.

Locality.	Port of Reference.	For High Water.	For Low Water.	Rise of Tide.	
				Springs.	Neaps.
		H. M.	H. M.	feet.	feet.
Strutton island	Harwich	Add 2 35	Add 2 40	5¾	4
Stag island	"	" 3 46	" 3 41	9	7¼
Ship Sands	Nelson	" 4 01	" 3 30	8¼	6¼
Revillon	"	" 5 56	" 5 05	6½	4¾
Moose Factory*	"	" 5 53	" 5 47	5½	4¼
Rupert House	"	" 6 00	" 5 20	6½	4½

* The *Range* of the tide at Moose Factory is 36 per cent of the range at Nelson. The rise above Low Water may safely be taken as at least in the same proportion.

Observations on which the Tidal Differences are based.

ASHE INLET.—Observations of 1884 to 1886, as already explained.

HUDSON STRAIT.—The observations extend over parts of 1884, 1885 and 1886; and those that could be utilized for comparison make up the following periods of time: Port Burwell, 7½ months; Stupart bay, 3½ months; DeBoucherville, 5½ months; Laperrière, 1¼ months.

CHURCHILL.—Observations during parts of August, September and October in 1910, compared with Harwich.

MOOSE FACTORY.—Observations for 1½ months in 1912, and for 2 months in 1913.

SHIP SANDS.—Observations for 1¼ months in 1915.

REVILLON.—Observations for 2 months in 1912, compared with simultaneous tidal record at Moose Factory, and reduced to Nelson.

RUPERT HOUSE.—Observations for 15 days in July, 1912, also simultaneous with Moose Factory, and reduced to Nelson.

STAG ISLAND.—Day tides during 3 months in 1912, and continuous observations for 2 months in 1913.

STRUTTON ISLAND.—Observations for 2 months in 1914.

TIDE TABLES.—PORT NELSON.—1920.

Date.	Day.	JULY. High Water. Time.	H't.	High Water. Time.	H't.	Low Water. Time.	Time.	Date.	Day.	AUGUST. High Water. Time.	H't.	High Water. Time.	H't.	Low Water. Time.	Time.
		H. M.	FT.	H. M.	FT.	H. M.	H. M.			H. M.	FT.	H. M.	FT.	H. M.	H. M.
1	Th.	10:19	13·1	22:48	13·4	6:18	18:31	1	Sn.	11:13	14·1	23:42	14·2	7:21	19:29
2	F.	10:56	13·7	23:24	13·9	7:02	19:11	2	M.	11:47	14·2	....	.....	7:58	20:03
3	Sa.	11:30	14·1	23:57	14·2	7:40	19:46	3	Tu.	0:14	14·2	12:25	14·2	8:30	20:41
4	Sn.	....	.....	12:09	14·2	8:13	20:25	4	W.	0:47	14·1	12:52	14·0	9:02	21:06
5	M.	0:31	14·2	12:39	14·1	8:49	20:54	5	Th.	1:19	13·7	13:27	13·5	9:31	21:37
6	Tu.	1:02	14·1	13:10	13·9	9:16	21:22	6	F.	1:51	13·2	14:04	12·9	9:58	22:08
7	W.	1:38	13·7	13:45	13·4	9:48	21:52	7	Sa.	2:29	12·6	14:43	12·4	10:30	22:41
8	Th.	2:14	13·2	14:24	12·8	10:18	22:25	8	Sn.	3:06	12·1	15:32	11·8	11:01	23:24
9	F.	2:51	12·5	15:06	12·3	10:49	23:01	9	M.	4:03	11·7	16:38	11·7	11:53	.....
10	Sa.	3:36	12·0	16:02	11 8	11:28	23:53	10	Tu.	5:17	11·9	18:04	12·2	0:28	13:07
11	Sn.	4:37	11·6	17:10	11·6	.....	12:27	11	W.	6:43	12·7	19:35	13·2	1:56	14:38
12	M.	5:51	11·8	18:29	12·1	1:00	13:42	12	Th.	8:06	13·6	20:47	14·1	3:33	16:08
13	Tu.	7:12	12·5	19:54	13·1	2:24	15:20	13	F.	9:15	14·5	21:57	14·8	4:53	17:23
14	W.	8:25	13·5	21:04	14·0	3:56	16:31	14	Sa.	10:12	15·2	22:47	15·5	6:07	18:24
15	Th.	9:27	14·4	22:04	14·8	5:12	17:37	15	Sn.	10:58	15·7	23:32	15·8	7:01	19:13
16	F.	10:22	15·1	22:57	15·5	6:16	18:36	16	M.	11:42	15·9	....	.....	7:48	19:58
17	Sa.	11:11	15·7	23:44	15·9	7:12	19:27	17	Tu.	0:13	15·8	12:25	15·7	8:29	20:41
18	Sn.	11:59	15·9	.....		8:00	20:15	18	W.	0:54	15·4	13:02	15·1	9:10	21:17
19	M.	0:33	15·9	12:45	15·8	8:49	21:01	19	Th.	1:25	14·8	13:34	14·4	9:39	21:46
20	Tu.	1:15	15·6	13:27	15·4	9:30	21:41	20	F.	1:58	14.0	14:12	13·6	10:08	22:19
21	W.	1:53	15·1	14:03	14·6	10:05	22:13	21	Sa.	2:30	13·2	14:46	12·7	10:34	22:47
22	Th.	2:31	14·7	14:42	13·8	10:38	22:46	22	Sn.	3:06	12·3	15:34	11·8	11:01	23:29
23	F.	3:07	13·3	15:25	12·8	11:08	23:23	23	M.	4:02	11·4	16:43	11·2	11:54	.....
24	Sa.	3:50	12·5	16:14	12·0	11:45	... ..	24	Tu.	5:14	11·0	17:59	11·0	0:33	13:04
25	Sn.	4:50	11·6	17:25	11·3	0:06	12:40	25	W.	6:31	10·9	19:21	11·0	1:49	14:21
26	M.	5:59	11·1	18:42	11·1	1:15	13:49	26	Th.	7:44	11·1	20:27	11·5	3:11	15:36
27	Tu.	7:16	11.1	20:01	11·3	2:32	15:06	27	F.	8:45	11·8	21:20	12·1	4:22	16:43
28	W.	8:22	11·5	21:00	11·9	3:53	16:17	28	Sa.	9:32	12·5	22:04	12·9	5:22	17:38
29	Th.	9:16	12·1	21:49	12·5	4:58	17:18	29	Sn.	10:10	13.4	22:39	13·7	6:13	18:22
30	F.	10:01	12·9	22:30	13·4	5:53	18:10	30	M	10:48	13·9	23:15	14·1	6:53	18:53
31	Sa.	10:37	13·7	23:06	13·9	6:42	18:51	31	Tu.	11:23	14·3	23:48	14·3	7:31	19:39

The TIME used is Central Standard, for the 90th Meridian, which is six hours slower than Greenwich Mean Time. It is counted from 0 to 24 hours from midnight to midnight.

The HEIGHT is measured from the level of Low Water at Spring tides, which has been adopted as the Chart datum. It may be assumed that all Low Waters are within a foot of the datum level; as they are almost as low at the Neaps as at the Springs.

TIDE TABLES.—PORT NELSON.—1920.

Date.	Day.	SEPTEMBER.						Date.	Day.	OCTOBER.					
		High Water.				Low Water.				High Water.				Low Water.	
		Time.	H't.	Time.	H't.	Time.	Time.			Time.	H't.	Time.	H't.	Time.	Time.
		H. M.	FT.	H. M.	FT.	H. M.	H. M.			H. M.	FT.	H. M.	FT.	H. M.	H. M.
1	W.	11:56	14·4	.....		8:04	20:12	1	F.	... .		12:09	14·9	8:09	20:25
2	Th.	0:19	14·3	12:31	14·3	8:35	20:46	2	Sa.	0:29	14·9	12:47	14·8	8:44	21:01
3	F.	0:53	14·1	13:06	13·9	9:07	21:18	3	S.	1:06	14·6	13:29	14·5	9:18	21:39
4	Sa.	1:28	13·7	13:44	13·5	9:38	21:51	4	M.	1:48	14·3	14:16	14·0	9:55	22:20
5	S.	2:05	13·2	14:27	12·8	10:09	22:28	5	Tu.	2:31	13·7	15:08	13·5	10:32	23:06
6	M.	2:47	12·6	15:16	12·3	10:45	23:11	6	W.	3:36	13·1	16:24	12·9	11:31	.....
7	Tu.	3:44	12·1	16:30	12·0	11:36	.. .	7	Th.	4:59	12·7	17:49	12·6	0:16	12:49
8	W.	5:03	12·1	17:58	12·3	0:20	12:53	8	F.	6:25	12·6	19:16	12·8	1:39	14:15
9	Th.	6:33	12·6	19:27	13·0	1:48	14:25	9	Sa.	7:45	13·0	20:26	13·3	3:08	15:40
10	F.	7:56	13·5	20:41	13·8	3:22	15:54	10	S.	8:44	13·5	21:19	13·8	4:24	16:46
11	Sa.	9:01	14·2	21:41	14·6	4:43	17:07	11	M.	9:34	13·9	22:04	14·1	5:25	17:42
12	S.	9:54	14·9	22:27	15·1	5:49	18:04	12	Tu.	10:16	14·3	22:40	14·5	6:14	18:28
13	M.	10:39	15·4	23:07	15·5	6:39	18:53	13	W.	10:54	14·6	23:18	14·8	6:54	19:09
14	Tu.	11:20	15·6	23:47	15·6	7:22	19:36	14	Th.	11:32	14·8	23:50	14·7	7:34	19:48
15	W.	11:59	15·5	..... .		8:03	20:15	15	F.	..... .		12:04	14·6	8:06	20:20
16	Th.	0:21	15·3	12:34	15·0	8:37	20:50	16	Sa.	0:19	14·5	12:37	14·3	8:35	20:52
17	F.	0:53	14·8	13:07	14·5	9:08	21:21	17	S.	0:50	14·0	13:12	13·7	9:04	21:24
18	Sa.	1:23	14·2	13:40	13·8	9:35	21:50	18	M.	1:22	13·4	13:50	13·0	9:32	21:57
19	S.	1:56	13·4	14:15	12·9	10:03	22:19	19	Tu.	2:01	12·6	14:30	12·1	10:05	22:31
20	M.	2:31	12·4	15:01	12·0	10:32	22:59	20	W.	2:48	11·8	15:26	11·4	10:46	23:21
21	Tu.	3:22	11·6	16:05	11·2	11:17	23:57	21	Th.	3:52	11·1	16:33	10·9	11:44	.....
22	W.	4:31	11·0	17:21	10·8	....	12:21	22	F.	5:06	10·8	17:49	10·8	0:23	12:56
23	Th.	5:47	10·8	18:39	10·8	1:11	13:37	23	Sa.	6:17	10·9	19:00	11·0	1:39	14:07
24	F.	7:04	10·9	19:49	11·1	2:29	14:54	24	S.	7:23	11·3	20:02	11·6	2:50	15:15
25	Sa.	8:08	11·5	20:45	11·8	3:41	16:03	25	M.	8:18	12·1	20:52	12·5	3:57	16:16
26	S.	8:57	12·2	21:30	12·6	4:43	16:59	26	Tu.	9:05	13·0	21:33	13·5	4:54	17:11
27	M.	9:40	13·1	22:09	13·6	5:36	17:49	27	W.	9:47	14·1	22:10	14·5	5:42	17:59
28	Tu.	10:18	14·0	22:44	14·3	6:21	18:32	28	Th.	10:27	14·8	22:50	15·1	6:24	18:42
29	W.	10:54	14·6	23:19	14·8	6:59	19:10	29	F.	11:08	15·3	23:31	15·5	7:06	19:24
30	Th.	11:32	14·9	23:53	14·9	7:35	19:48	30	Sa.	11:51	15·6	.....		7:47	20:07
								31	S.	0:11	15·6	12:36	15·6	8:27	20:51

The Time used is Central Standard, for the 90th Meridian, which is six hours slower than Greenwich Mean Time. It is counted from 0 to 24 hours from midnight to midnight.

The Height is measured from the level of Low Water at Spring tides, which has been adopted as the Chart datum. It may be assumed that all Low Waters are within a foot of the datum level; as they are almost as low at the Neaps as at the Springs.